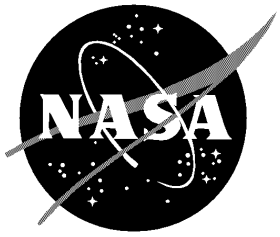

National Aeronautics
and Space Administration

MARCH 7, 1997

NRA 97-OSS-04

Research Announcement

Exploration of the Solar System: Research in Planetary Sciences

Proposals Due: JUNE 06, 1997

OMB Approval No. 2700-0087

Exploration of the Solar System:
Research in Planetary Sciences

NASA Research Announcement (NRA)
Soliciting Proposals for Basic Research

Proposals due June 06, 1997

NRA 97-OSS-04
Issued: March 07, 1997

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

EXPLORATION OF THE SOLAR SYSTEM: RESEARCH IN PLANETARY SCIENCES

This NASA Research Announcement (NRA) solicits proposals for basic research to conduct scientific investigations in the areas of:

- Planetary Astronomy
- Planetary Atmospheres
- Cosmochemistry (formerly Planetary Materials and Geochemistry Program)
- Planetary Geology and Geophysics

Previously, solicitations for each of these programs were separate NRA's. This year proposals are solicited under this single NRA. Participation in this program is open to all categories of organizations, both domestic and non-U.S.: industry, educational institutions, other nonprofit organizations, NASA centers, and other Government agencies.

The Appendices to this Announcement include further details relevant to these programs. Appendix A provides technical and program information for the general areas in which proposals are sought, plus amendatory guidance to Appendix B, applicable only to this NRA. Appendix B contains the basic guidance needed for preparation of solicited proposals in response to an NRA. Appendix C contains standard formats for key required forms for proposals submitted in response to this NRA. Appendix D contains guidance needed for requesting funds for major equipment items used in support of proposed research. This NRA and all Appendices are on the Office of Space Science home page on the World Wide Web. The URL address is <**http://www.hq.nasa.gov/office/oss/**>, open "Research Opportunities."

It is estimated that the NASA funding level for the Planetary Geology and Geophysics and Cosmochemistry Programs in FY 1998 will be approximately $12 million each, for Planetary Atmospheres about $7.5M, and for Planetary Astronomy about $10M. The level of funding will support approximately 100 - 150 research investigations in each program, including new proposals and supplement proposals. The selection of any proposals is contingent on the availability of FY 1998 funds.

This NRA features many significant changes from previous NRAs for the Planetary Geology and Geophysics Program, Planetary Materials and Geochemistry (now Cosmochemistry) Program, Planetary Astronomy Program, and Planetary Atmospheres Program. It is recommended that the proposer carefully review this document before submitting a proposal.

The following summary applies only to this Announcement:

Identifier:	NRA 97-OSS-04
Proposals Due:	June 06, 1997
Submit Proposals to:	Exploration of the Solar System NRA [insert specific program name] The Lunar and Planetary Institute (LPI) 3600 Bay Area Boulevard Houston, TX 77058 (713) 486-2149
Copies Required:	Proposals for new Research: 15 Progress Report Proposals: 5
	(All Proposals must contain 4 additional copies of Appendix C)
Selecting Official:	Director Research Program Management Division Office of Space Science
Anticipated Date of Selection	October, 1997
Obtain Additional Information from:	Walter Huebner Discipline Scientist for Planetary Astronomy (202)358-0828 walter.huebner@hq.nasa.gov Jay Bergstralh Discipline Scientist for Planetary Atmospheres (202)358-0313 jay.bergstralh@hq.nasa.gov Joe Boyce Discipline Scientist for Cosmochemistry (202)358-0302 joseph.boyce@hq.nasa.gov Trish Rogers Discipline Scientist for Planetary Geology and Geophysics (202)358-0294 patricia.rogers@hq.nasa.gov Research Program Management Division, Code SR NASA Headquarters Washington, DC 20546-0001 USA FAX: (202) 358-3097

Your interest and cooperation in participating in this opportunity are appreciated.

Jurgen Rahe
Science Program Director
Solar System Exploration
Office of Space Science

NASA Research Announcement

Exploration of the Solar System: Research in Planetary Sciences

EXPLORATION OF THE SOLAR SYSTEM: RESEARCH IN PLANETARY SCIENCES

I. DESCRIPTION OF SCIENCE DISCIPLINES

A. PLANETARY ASTRONOMY PROGRAM

The Planetary Astronomy activity supports ground-based telescopic observations that contribute to the understanding of the general properties and evolution of the planets and their satellites, and of asteroids and comets. It includes observations made over a wide range of wavelengths from ultraviolet to radio and their analysis. The data obtained must be useful for basic research in support of planetary program objectives that either cannot be met by current spacecraft missions or directly support specific flight missions. Proposals are sought for new projects that fall within the scope of the Planetary Astronomy Program. Projects that include follow-on efforts of existing grants that are in their last year of performance are defined as new projects. Ground-based observations supplementing NASA missions that will be returning significant amounts of data within the next three years are encouraged. These missions include Galileo, NEAR, Mars Pathfinder, and Mars Global Surveyor. Proposals for observations (and associated data analyses) relevant to Comparative Planetology with an Earth Perspective are encouraged. Presently about $10 million is budgeted for this program, and approximately 100 investigations are expected to be supported with these funds.

The National Science Foundation (NSF) also accepts proposals (from domestic organizations only) that contribute new knowledge in planetary astronomy. The same planetary astronomy proposal may be submitted to both NASA and NSF. In such a case, the proposal must clearly state that it is being submitted to both agencies. Planetary Astronomy Programs at NASA and NSF coordinate their reviews.

B. PLANETARY ATMOSPHERES PROGRAM

The Planetary Atmospheres activity supports scientific investigations that contribute to the understanding of the general properties, origins, and evolutions of the neutral and ionized atmospheres of planets and their satellites and of comets. Its broad objectives include the determination of compositions and chemical behaviors of planetary atmospheres; sources of and mechanisms for deposition of energy; characterization and understanding of dynamical processes; and relationships between currently observed properties and/or states of matter, chemical abundances, physical conditions, and processes that prevailed at the time the planets were formed. Proposals are sought for new projects that fall within the scope of the Planetary Atmospheres Program. Projects that include follow-on efforts of existing grants that are in their last year of performance are defined as new projects.

The scope of the Planetary Atmospheres activity includes laboratory investigations that supply basic physical measurements needed to interpret planetary data. These include measurements and calculations of spectroscopic properties, excitation/dissociation/ionization cross-sections, optical properties, and thermodynamic properties of materials found in planetary atmospheres. Data analysis proposals addressing NASA missions that will be returning significant amounts of data within an approximate three year timescale are encouraged. These include Galileo, Mars Pathfinder, and Mars Global Surveyor.

Note that atmospheres of extrasolar planets *are* included within the scope of the Planetary Atmospheres activity, but *not* included are investigations of Earth's atmosphere or of nonplanetary

astrophysical objects. However, terrestrial and/or astrophysical subjects may be included as subordinate elements in comparative studies aimed primarily at elucidating the nature and properties of the atmospheres of planets other than Earth.

Presently about $7.5 million is budgeted for this program, and approximately 100 investigations are expected to be supported with these funds.

C. COSMOCHEMISTRY

The Cosmochemistry Program (CCP), formerly the Planetary Materials and Geochemistry (PM&G) Program, supports scientific investigations that may involve laboratory studies of a variety of extraterrestrial materials (meteorites, cosmic dust, and lunar samples) that are aimed at understanding the geochemical nature of the solar system bodies (planets, satellites including the Earth's Moon, and small solar system bodies), or that address the formation and chemical development of the solar system. The goals of this program are to support research projects that increase the understanding of the origin of the solar system, and the processes by which its planets and small bodies have evolved to their present state, and/or yield direct information about the formation of the solar system, the exact time scales for planetary formation and history, the nature and development of planetary surfaces, and the past activity of the Sun and cosmic rays.

NASA is particularly interested in proposals for sample research projects that closely support its activities for the exploring the solar system, determining its nature, origin, and history, and that contribute to the development of techniques for further exploration. Individual investigations may involve direct measurements of physical and chemical properties, or research efforts that contribute new data, that analyze and synthesize existing data, or that combine both kinds of activities. Examples of the kinds of research supported by this program include: studies of solar system formation; studies of chemical differentiation of planetary bodies; laboratory studies of phase stability, thermal emission, chemical partitioning, and other processes necessary to interpret planetary data; synthesis of previously obtained geochemical data; and direct measurements of mineral compositions, major and trace element chemistry, isotopic compositions, radiometric ages, magnetism, radiation exposure effects; and Lunar highlands and mare petrology, lunar studies, lunar craters and microcraters, lunar physical and mechanical properties, and proposals that are designed to obtain basic scientific information that might enable usage of extraterrestrial resources. However, the CCP will not consider proposals that are designed to demonstrate a technology that would actually use extraterrestrial resources. The CCP program is also interested in supporting certain types of research on terrestrial samples or with terrestrial analogs when such efforts contribute to overall program goals in cosmochemistry. Proposals to analyze terrestrial samples or their analogs should clearly develop the nature of the planetary connection. The specific connection to the wider range of planetary processes is a key factor in determining the success of such proposals. Though no priorities are imposed on the general kinds of investigations, an ideal program is envisaged as a balance among these objectives, consistent with the quality of submitted proposals and their relevance to the current CCP. Anticipated funding for this program is approximately $12M for FY 1998. This is expected to support about 100 investigations.

An important goal of the CCP is to facilitate access to data and extraterrestrial sample material for scientific and educational purposes. The Johnson Space Center (JSC) is responsible for the security, access to, and distribution of materials in the lunar sample collection. In addition, and as part of a joint program among NASA, NSF, and the Smithsonian Institution, hundreds of well-preserved meteorites collected from the Antarctic ice cap are maintained, characterized, and distributed by JSC. JSC is also responsible for the program to collect, preserve, document, and distribute for scientific research interplanetary dust particles collected by high altitude aircraft. For information on how to obtain any specimens of the lunar sample collection, as well as interplanetary dust particles collected by high altitude aircraft, and meteorites collected in Antarctica by field parties supported by NSF, contact the Curator, Dr. James Gooding:

Dr. James Gooding
NASA's Office of the Curator
Johnson Space Center
Houston, TX 77058
telephone (218)483-3274, E-mail: gooding@snmail.jsc.nasa.gov

The National Science Foundation (NSF) also accepts a wide range of proposals (from domestic organizations only) that contribute new knowledge in the area of cosmochemistry and related fields. The same proposal may be submitted to both NASA and NSF. In such cases, the proposals must clearly state they are being submitted to both agencies.

D. PLANETARY GEOLOGY AND GEOPHYSICS (PGG) PROGRAM

The Planetary Geology and Geophysics Program (PGG) supports scientific investigations of the planetary surfaces and interiors, satellites (including the Moon), satellite and ring systems, and smaller solar system bodies such as asteroids and comets. The goals of the PGG program are to foster the gathering, synthesis, analysis, and comparative study of data that will improve the understanding of the extent and influence of planetary geological and geophysical processes on the bodies of the solar system, the origin and evolution of the solar system, and the nature of Earth and its history in comparison with other planets.

The PGG program supports research investigations relevant to the scientific interpretation of data from past and existing planetary missions, as well as the science objectives of future missions. These investigations involve several types of research efforts such as, but not limited to: analysis and synthesis of existing data; theoretical and numerical modeling of data and processes; generation of new basic data in a laboratory environment; and combinations of these kinds of activities. Examples of the kinds of research supported by this program include: 1) direct analysis of data from planetary missions; 2) theoretical modeling of geologic and geophysical processes; 3) photogeologic analysis and geologic interpretation of planetary surfaces; 4) compositional and geologic mapping of planetary surfaces; 5) laboratory and remote sensing studies; 6) experimental studies of materials under conditions relevant to objects in the solar system; 7) theoretical studies of the interiors of planetary bodies; 8) the dynamical evolution of the planets, satellites, small solar-system bodies and ring systems; and 9) geologic field studies of terrestrial analogs to planetary phenomena in the context of providing better understanding of the planetary phenomena. In addition, the program supports the development and production of cartographic products of planetary data sets. Scientific investigations that involve geologic mapping of planetary surfaces at appropriate scales are within the scope of the program and should be submitted as a separate proposal rather than incorporated within the body of a larger proposal. Proposals to study or develop flight instruments or study future planetary missions are beyond the scope of this program.

Proposed investigations of any planetary or satellite surface that are intended, as a by-product of the scientific research, to result in a geologic map suitable for publication by the U.S. Geological Survey, should check the relevant box on the cover sheet and clearly indicate this intention in the abstract and text of the proposal. Efforts aimed at acquiring observations of planetary surfaces and interiors may produce data of wide scientific interest. It is expected that these data sets would, after a reasonable amount of time, be archived within the Planetary Data System (PDS). Contact R. E. Arvidson (PDS Geoscience Node) for further information regarding the types of data sets that might be of interest for archiving purposes (E-mail: <arvidson@wunder.wustl.edu> or 314-935-5609).

Anticipated funding for this program is approximately $12 million for FY 1998. This is expected to support about 100 to 150 research investigations.

II. PROGRAM MANAGEMENT INFORMATION

Two types of proposals are solicited through this NRA: New Proposals and Supplement Proposals. A **New Proposal** is a proposal that is submitted in response to this NRA for work that is not currently supported by any of the programs covered by this NRA. A **Renewal (Full) Proposal** is a proposal submitted in response to this NRA from a PI who currently has a grant for a related project and is seeking continued funding for similar work. A **Supplement (Progress) Proposal** is used to report progress on an existing multiyear grant (i.e., the second or third year of work on a three-year grant award from a previous related NRA). This type of proposal has, in the past, been referred to as a Progress Report. All types of investigations will compete in the same process for review, evaluation, and selection. Please pay careful attention to the following differences among the four programs covered in this NRA. **Supplemental (Progress) Proposals for the Cosmochemistry and PG&G Programs are due by the same deadline as New Proposals. Supplemental Proposals for the Astronomy and Atmospheres programs are due a minimum of 90 days before the anniversary date of the original grant award**.

The normal period of performance is from one to three years, but in a few justifiable cases, the period of performance can extend five years. Call your Discipline Scientist before submitting a proposal with a period of performance longer than three years. Regardless, proposals that are selected will receive funding for one year at a time. Funding for additional years will be based on the review and evaluation of the Supplement Proposal and on budgetary considerations. New research investigations resulting from this solicitation are expected to have starting dates after March 1998.

All proposals received in response to this NRA will be screened to determine responsiveness to the NRA. Any submission that is considered to be unresponsive to the NRA (e.g., failure to follow the guidelines outlined in this NRA) will be treated as correspondence and returned to the proposer.

III. PROPOSAL PREPARATION INFORMATION

Prepare proposals in accordance with the guidelines in Appendix B, except for the new provisions identified below. In case of a conflict, the provisions below take precedence.

A. The "Conformance to Guidance" and "Proposal Contents" section of Appendix B are modified as follows:

The Cover Page, Other Personnel, Abstract, Budget Summary, and Current and Pending Research Forms for each proposal constitute prefatory materials that must use the sample formats in Appendix C. Note that the "Transmittal Letter or Prefatory Material" sections still apply and that complete, detailed budgets and cost breakdowns must still appear in the main body of this proposal. The original proposal must bear the signature of a responsible official or authorized representative of the organization, or any other person authorized to commit contractually or obligate the organization (unless the signature appears on the proposal itself). The remainder of the proposal immediately following the summary pages should be prepared using the guidelines in section 7 of Appendix B; additional headings and subheadings may be used in addition to those outlined.

Also included in Appendix C are the three certification forms. One set of these completed forms must be included with the original signature version of all (including supplement) proposals.

B. The following statements are added to the “Proposal Contents” section of Appendix B.

The responsibilities and contributions of the Principal Investigator and Co-Investigators must be clearly enumerated within the body of the proposal. Where a proposal contains multiple independent tasks, this information must be provided on a task by task basis.

For proposals with multiple independent tasks, the resource allocations among the tasks (including personnel and other costs) must be clearly enumerated in the Budget Summary sheet at the beginning of the proposal.

Finally, for proposals with multiple independent tasks, the PI must identify and fully justify no more than five tasks to be given the highest priority in the first year of effort.

C. The following statements are added to the "Project Description" section of Appendix B:

A brief introduction, background, and justification of the proposed research should be included. The description should provide a full statement of the research proposed, identifying and relating the key elements. Give attention to the nature and amount of data to be collected; describe the methods or approaches to be used, as appropriate; discuss the advantages of the proposed approach over alternatives; and discuss the significance of the expected results. The content of the proposal should provide sufficient detail to enable a reviewer to make evaluative judgments with respect to all the factors identified in Appendix B, Section 13, "Evaluation Factors" of this NRA.

NASA policies require public accessibility to data obtained by NASA. All proposers must indicate their archiving plans in the body of their proposal. They should include sufficient resources in their budgets to prepare their data for archiving in a timely manner and according to the standards of the Planetary Data System. Detailed procedures are now in place for handling and archiving data from missions. These programs are subject to the same general NASA-wide guidelines and expect grantees to document properly and permanently archive their data and to make them available in a timely fashion. Guidelines for archiving planetary data are available from the Planetary Data System (<http://pds.jpl.nasa.gov> in the section “submitting data to the PDS”) or from its various discipline nodes (all of which have links from the above address).

A specific titled section describing the relevance of the proposed research to the relevant program objectives should be included in the body of the proposal. The length of this section should be no more than one page and should address the relevance of the proposed research to: (1) increasing the scientific understanding of the solar system and objects in it, or (2) new interpretations of data from NASA space flight missions.

The Project Description must clearly identify the roles and responsibilities of the Principal Investigator and Co-Investigators for the proposed research. Generally, Co-Investigators will make a critical or significant contribution to the proposed research and may (but are not required to) receive a portion of the funding if the proposal is selected. Evidence of commitment on behalf of the Co-investigator is required and may take the form of a letter from the Co-investigator or an authorized institutional official.

Proposers who wish to perform experiments on lunar, Antarctic meteorite, and/or cosmic dust materials should describe the specific types and amount of lunar materials required. They should also specify the experimental procedures to be used and their effects on the lunar materials used. Because of the limited amount of materials available, nondestructive experimental techniques should be proposed wherever possible. All proposals that request that NASA supply lunar, Antarctic meteorite, and/or cosmic dust samples should demonstrate that the proposer is familiar with the actual materials available in these sample collections.

Dr. James Gooding, of NASA's Office of The Curator at Johnson Space Center, (telephone (218)483-3274, E-mail: gooding@snmail.jsc.nasa.gov) can provide advice to PI's concerning sample availability.

D. The "Length" section is modified as follows:

Limit the Project Description of each New Solicited Proposal to ten single-spaced, typewritten pages with appropriate margins using easily readable fonts (e.g., 10 point or larger)**.** The ten page limit does not include: Cover Page, Abstract, Budget Summary, Table of Contents, references, figures, requests for equipment augmentations, detailed budgetary information, reprints, certifications, or appendices. However, an absolute page limit of 75 pages of all material in the proposal is imposed. The proposals may not be bound with spiral binders or backing tape.

E. Supplement (Progress) Proposals:

In the PG&G and Cosmochemistry Programs the New and Supplement Proposals will compete in the same review process, although there may be differences in the details of the evaluation process, such as the number of external scientific reviews, panel discussion time, and documentation of the evaluation process.

It is required that the Project Description in Supplement Proposals, including a report of progress made during the past year, be limited to five single-spaced, typewritten pages and include a brief statement of planned work for the coming year, a report of progress made during the previous year, and a budget. Supplement Proposals must provide an estimate of the amount of previously awarded funds that will remain available at the end of the award year. The five page limit does not include: Cover Page, other personnel, Abstract, Budget Summary, Table of Contents, references, figures, requests for equipment augmentations, detailed budgetary information, reprints, certifications, or appendices. However, an absolute page limit of 75 pages of all material in the proposal is imposed. The proposals may not be bound with spiral binders or backing tape.

F. The "Evaluation Factors" section of Appendix B, Section 13, is replaced by the following:

Criteria considered in the technical evaluation of proposals are described below. Of the three factors listed, intrinsic scientific merit will carry the highest weight. Relevance to NASA missions and cost are of lower weight and equal in weight to each other.

a. INTRINSIC SCIENTIFIC MERIT, including:

(1) Potential impact on the field, including the extent to which progress in the field can be reasonably expected as an outcome of the proposed research.
(2) Uniqueness of the investigation as measured either by the extent to which it addresses high priority goals and objectives not addressed by other investigations or by the extent to which innovative new methods and approaches are proposed and documented.
(3) Understanding of the problem, including consideration of whether the proposal demonstrates that the proposer has a firm grasp of the approach and analytical techniques required to perform the proposed research.
(4) Soundness of approach, including consideration of whether the proposed approach to the investigation is appropriate and likely to yield the anticipated results.
(5) Ability of investigator(s), including qualifications, capabilities, and experience of the proposed Principal Investigator.
(6) Adequacy of facilities, including consideration of the capability and interest of the proposer's institution, as measured by its willingness to provide support necessary to ensure that the investigation can be completed satisfactorily.

b. RELEVANCE TO NASA MISSION OR OBJECTIVES, including:

(1) The degree to which the proposal fits within the scope of any of the discipline programs, as outlined at the beginning of Appendix A (Section I).
(2) The degree to which the proposed investigation addresses high priority goals and objectives of NASA research, as described in the OSS Strategic Plan, the Planetary Science Roadmap, and/or reports of other NASA advisory groups. These documents are available through the WWW at: <http://www.hq.nasa.gov/office/oss/>.

c. COST, including:

Cost realism; i.e., can the proposed research be achieved for the proposed resources? Is the work outlined in the proposal cost effective to the program? Are the proposed costs reasonable?

G. The following section, "Guidelines for Foreign Participation", is added to Appendix B:

GUIDELINES FOR FOREIGN PARTICIPATION

NASA welcomes the participation of non-U.S. investigators in its programs. NASA will, however, as is generally the case, operate on a no exchange of funds basis with non-U.S. investigators selected as a result of this competition. Non-U.S. investigators may play Co-Investigator roles in proposals submitted by U.S. Principal Investigators or they may propose as Principal Investigators in their own right with or without U.S. Co-I's. Proposals from non-U.S. entities do not include a cost plan. Non-U.S. proposals and U.S. proposals that include non-U.S. participation must be endorsed by the pertinent Government agency or funding/sponsoring institution in the country from which the non-U.S. participation is proposed. This endorsement should indicate that the proposal merits careful consideration by NASA, and that, if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

Send one copy of the documents to:

Shiron D. Gaines
Re: NRA/Research in Planetary Sciences
International Science and Aeronautics Division
Code IS
NASA Headquarters
Washington, DC 20546-0001
USA

Proposals, along with the requested number of copies and Letters of Endorsement, must arrive at NASA before the deadline established for this NRA. Send these documents to:

Planetary Sciences Review Panels
The Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, TX 77058
USA
(713) 486-2149

All proposals must be received before the established closing date. If review and endorsement are not possible before the announced closing date, sponsoring non-U.S. agencies may, in exceptional situations, forward a proposal without endorsement to NASA's International Science and Aeronautics Division, Code IS, along with the date when a decision can be expected.

All proposals must be typewritten in English. All non-U.S. proposals will undergo the same evaluation and selection process as those originating in the U.S. Non-U.S. proposals, and U.S. proposals which include non-U.S. participation, must follow all other guidelines and requirements described in this NRA.

Successful and unsuccessful proposers will be contacted directly by the NASA Program Office coordinating the NRA. Copies of these letters will be sent to the sponsoring government agency.

Should a non-U.S. proposal or a U.S. proposal with non-U.S. participation be selected, the NASA International Science and Aeronautics Division will arrange with the non-U.S. sponsoring agency for the proposed participation on a no exchange of funds basis, in which NASA and the non-U.S. sponsoring agency will each bear the cost of discharging its respective responsibilities. Depending on the nature and extent of the proposed cooperation, these arrangements will entail a letter of notification by NASA and an exchange of letters between NASA and the sponsoring governmental agency, or a formal agency-to-agency Memorandum of Understanding (MOU).

H. The following section, "Education and Public Outreach," is added to Appendix B.

Education and public outreach are expected to be part of each NASA flight program and research discipline. NASA strongly encourages researchers not only to engage actively in education and public outreach, but also to include such activities in their proposals. The proposal section for Education Outreach follows the main proposal's Project Description. The funding dedicated to education and public outreach is expected not to exceed 1-2% of the project's budget. Further details on the NASA OSS Education Policy may be found in *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* which describes the Office of Space Science's approach for making education at all levels and the enhancement of the public understanding of science integral parts of space science research activities. The document *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* describes the NASA OSS policy for implementation. Both documents may be obtained from the WWW at: <http://www.hq.nasa.gov/office/oss/>. Proposals will not be selected solely or primarily on the strength of their education/outreach components, although the quality of a proposed education/outreach effort could be used as an additional factor in selecting among otherwise equal proposals. Evaluation criteria for education components will include:

- The educational effectiveness and realism of program concept,
- the existence of effective partnerships with educational institutions and/or effective leveraging of existing resources and the prospects for the program to have a multiplier effect,
- the capability of proposers to carry out the proposed program,
- the consistency with national educational reform efforts, and
- the consistency of the budget with the guidelines given in the document *Implementing the OSS Education/Public Outreach Strategy.*

IV. SOURCES FOR INFORMATION AND DATA

Prospective proposers should be aware of sources for data that might be used in their research, and whether the required data are available. Useful contacts for making these determinations are given below:

General Lunar and Planetary Information

The Lunar and Planetary Institute (LPI) in Houston, TX, is the most concentrated and readily accessible source of information in lunar science. For information about its services contact:

Director
The Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, TX 77058
Telephone (713) 486-2180

Among the many valuable services available to the science community from the LPI are:

- LPI BULLETIN - This periodic information bulletin is published for free distribution to interested scientists and other individuals upon request.
- LUNAR AND PLANETARY DATA CENTER - The LPI maintains an extensive library of reprints, books, journals, maps, photographs, data, etc., that are available for on site use and, in special cases, for loan. The Data Center also serves as a source of general information on the kinds of lunar samples and returned artifacts in the collection at the JSC Curatorial Facility.
- LIBRARIAN SERVICES - Literature aids, bibliographies, and conference proceedings can be provided.
- STAFF SCIENTISTS - LPI Scientists who are active in lunar and planetary research and who are involved in the maintenance of the Lunar and Planetary Data Center are available to assist in examination of data prior to proposal preparation.
- LPI FACILITY - Arrangements can be made for selected investigators to conduct part of approved investigations at the LPI.

Data from Completed NASA Flight Programs

The National Space Science Data Center (NSSDC) stores digital and other data from completed flight experiments . Data of interest to investigators include: (1) lunar and planetary photographs, (2) digital planetary image data, (3) data from numerous flight-science experiments, and (4) lunar cartographic products. It is the responsibility of the investigator to acquire any required data from the NSSDC. Modest requests for imaging and nonimaging data will be supplied free of charge. A charge will be made for large requests. Direct requests from U.S. investigators to NSSDC for data products and data product availability information to:

National Space Science Data Center
Code 633.4
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771

Telephone (301) 286-6695

Direct requests from non-U.S. investigators to NSSDC for data products and product availability

information to:

World Data Center A for Rockets and Satellites
Code 633
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771
USA

Telephone (301) 286-6695

Lunar Sample Experiment Facilities

The Planetary Materials Facility at JSC contains a laboratory available to NASA supported researchers for those cases where the lunar samples are too large to be taken to an investigator's own laboratory. In general, each proposer must show in their budget the funds necessary to use the JSC facility. For information on this experiment facility, contact

Dr. Gordon McKay
Chief of Planetary Science Branch
Code SN4
National Aeronautics and Space Administration Johnson Space Center
Houston, TX 77058

Telephone (713)483-5041).

Planetary Cartographic Products

A variety of planetary cartographic products such as topographic, orthophoto, geological, and other special maps and geodetic information are available. Requests from NASA-funded investigators for production of special maps or other cartographic materials will be accommodated when possible. Request available data or specific maps from:

Branch of Distribution
U.S. Geological Survey
Federal Center
Box 25286
Denver, CO 80225
(303) 236-7477

Request information related to the availability of base maps and related materials or U.S. Geological Survey criteria for map publication from:

Branch of Astrogeology
U.S. Geological Survey
2255 North Gemini Drive
Flagstaff, AZ 86001

Telephone (602) 556-7262

Regional Planetary Image Facilities

Regional Planetary Image Facilities (RPIF's) contain nearly half a million images of the planets and their satellites taken both from Earth and manned and unmanned spacecraft, as well as topographic and geologic maps produced from these images. The RPIF's, located at institutions worldwide, are intended for use by individuals and groups who use photographic and cartographic materials of the planets and satellites in their research programs. These programs include geologic, photometric, colorimetric, photogrammetric, and atmospheric dynamical studies. In addition to the local scientists and their associates who use these data on a daily basis, investigators throughout the world are encouraged to use the RPIF's. Many researchers use this type of material but have access only to limited collections in their own institutions. These individuals can significantly enhance their research programs by using one of the RPIF's. Send inquiries to the nearest facility in care of the Director, Regional Planetary Image Facility: Note that these centers are used for on-site study and selection of planetary and satellite images. They are not facilities for the production of photographs for users. Obtain those materials from the National Space Science Data Center at the Goddard Space Flight Center.

- MS 202-100, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109
- Space Imagery Center, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721
- Branch of Astrogeology, U.S. Geological Survey, 2255 North Gemini Drive, Flagstaff, AZ 86001
- Department of Earth and Planetary Sciences, Washington University, P. O. Box 1169, St. Louis, MO 63130-4899
- Space Sciences Building, Cornell University, Ithaca, NY 14853-6801
- Department of Geological Sciences, Brown University, Box 1846, Providence, RI 02912
- Center for Information and Research Services, Lunar and Planetary Institute, 3600 Bay Area Boulevard, Houston, TX 77058
- Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, Washington, DC 20560
- Planetary Geosciences Division/SOEST, University of Hawaii, 2525 Correa Road, Honolulu, HI 96822
- Space Photography Laboratory, Department of Geology, Arizona State University, Tempe, AZ 85287-1404
- University of London Observatory, Observatory Annex, 33/35 Daws Lane, London NW7 4SD, England
- Instituto Astrofisica Spaziale, Reparto Planetologia, Viale Dell 'Universita, 11 00185, Roma, Italy
- Deutsche Forschungsahstalt fuer Luft und Raumfahrt, Rudower Chaussee 5, O-1199 Berlin, Germany
- Universite Paris-Sud, Phototheque Planetaire d'Orsay, Department Des Sciences De La Terre, Laboratoire de Geologie Dynamique De La Terre Et Des Planetes (Bat. 509), F-91405 Orsay Cedex, France
- ISAS, Division of Planetary Science, 3-1-1 Yoshinodai, Sagamihara, Kanagawa, 229, Japan

Decalibrated Digital Planetary Image Data

Digital planetary image data are available through the discipline nodes of the Planetary Data System. Submit requests for imaging data and support documentation to:

Planetary Data System/Imaging Node
U.S. Geological Survey
2255 N. Gemini Drive
Flagstaff, AZ 86001

Telephone (602) 556-7262

Submit requests for other planetary geoscience data to:

Planetary Data System/Geosciences Node
Washington University
Campus Box 1169
One Brookings Drive
St. Louis, MO 63130

Telephone (314) 935-6652

V. EXPERIMENTAL FACILITIES

Planetary Aeolian Facility

The Planetary Aeolian Facility at NASA Ames Research Center is available to approved investigators to carry out laboratory experiments dealing with aeolian processes. The facility consists of wind tunnels to simulate atmosphere-surface interactions on Earth, Mars, and Venus. The Mars Surface Wind Tunnel is an open-circuit, atmospheric boundary-layer wind tunnel operating from 1 bar to 3.5 mbar pressure with carbon dioxide as the working fluid. The test section is 13 m long. The Venus Wind Tunnel is a closed-circuit, boundary layer tunnel that operates with carbon dioxide to a maximum pressure of 35 bars, producing the same fluid density as the Venusian atmosphere at 60 bars and 735 K. For more information contact:

Dr. Ronald Greeley
Department of Geology
Arizona State University
Tempe, AZ 85287

602-965-7029 (Phone)
602-965-8102 (Fax)
greeley@asu.edu (email)

Reflectance Experiment Laboratory (RELAB)

The RELAB facility at Brown University provides a mechanism for researchers to obtain laboratory spectra of geologic materials for use in compositional and/or geologic applications. The RELAB is supported by NASA as a multiuser spectroscopy facility, and laboratory time can be made available at no charge to investigators funded by NASA programs.

RELAB has two operational spectrometers available to NASA supported scientists: a visible to near-infrared bi-directional spectrometer and a near- and mid-infrared FTIR spectrometer. The overall purpose of the design and operation of the RELAB bi-directional spectrometer is to obtain high precision, high spectral resolution, bi-directional reflectance spectra of Earth and planetary materials. One of the key elements of its design is the ability to measure samples using viewing geometries specified by the user. This allows investigators to simulate, under laboratory conditions, reflectance spectra obtained remotely (i.e., with spaceborne, telescopic, and airborne systems), as well as to investigate geometry dependent reflectance properties of geologic materials. The Nicolet 740 FTIR spectrometer is a bi-conical instrument and operates in reflectance mode from 0.8 to 25 microns. For information on this facility and/or requests to receive a RELAB User's Manual, contact:

Dr. Carle M. Pieters
RELAB Science Manager
Department of Geological Sciences
Box 1846
Brown University
Providence, RI 02912

401-863-2417 (Phone)
401-863-3978 (Fax)
pieters@pggipl.geo.brown.edu (email)

NASA-Ames Vertical Gun Range (AVGR)

The NASA-AVGR is a national facility funded by the NASA Office of Space Sciences. The AVGR enables investigations of impact phenomena and processes. A high pressure pneumatic system is designed for low velocity (< 300 m/sec by 50 g) projectiles, while a single-stage powder gun provides velocities from 0.5 to 2.5 km/sec with smaller projectiles (e.g., 0.635 cm aluminum). The two-stage light-gas gun achieves launch velocities up to about 6 km/sec for 0.635 aluminum spheres. The AVGR was specifically designed for studies of gravity-dependent impact processes (flat-lying targets) with variable launch angles in 15° increments. High-speed film and video can record processes through large side windows and smaller auxiliary ports above.

Exploratory or proof-of-concept programs requiring a limited number of experiments can be accommodated at no cost. More extensive programs are subject to review in order to assess feasibility and cost effectiveness. All experimental programs also must meet necessary readiness and safety requirements. Users are required to be on site during their experiments.

For more information, potential users of the AVGR should contact:

Dr. Peter Schultz
Department of Geological Sciences
Box 1846
Brown University

Providence, RI 02912

401-863-2417 (Phone)
401-863-3978 (Fax)
peter_schultz@brown.edu (Email)

VII. MAJOR EQUIPMENT REQUESTS

Funds may be available under the Planetary Instrument Upgrade Program (PIUP) to provide for the upgrading of analytical, computational, and other instruments required by investigations sponsored by the Discipline Programs. Major instrumentation that is necessary for the conduct of proposed research or that would substantially improve its quality, or would have broad applicability in the science community, should be identified and requested in a special section of each proposal entitled "Major Equipment Request." Details of specific guidelines, restrictions and exclusions are provided in Appendix D of this NRA.

GUIDELINES FOR RESPONDING TO
NASA RESEARCH ANNOUNCEMENTS (NRA)
FOR SOLICITED BASIC RESEARCH PROPOSALS

JUNE 1995

OFFICE OF PROCUREMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, DC 20546

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

(JUNE 1995)

1. Foreword

a. These instructions apply to "NASA Research Announcements." The "NASA Research Announcement (NRA)" permits competitive selection of research projects in accordance with statute while preserving the traditional concepts and understandings associated with NASA sponsorship of research.

b. These instructions are Appendix I to 1870.203 of the NASA Federal Acquisition Regulation Supplement.

2. Policy

a. Proposals received in response to an NRA will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

b. A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

3. Purpose

These instructions supplement documents identified as "NASA Research Announcements." The NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

4. Relationship to Award

a. A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument.

b. Grants are generally used to fund basic research in educational and nonprofit institutions, while research in other private sector organizations is accomplished under contract. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement (NHB 5100.4). Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NHB 5800.1).

5. Conformance to Guidance

a. NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

b. To be considered responsive, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

6. NRA-Specific Items

Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

7. Proposal Contents

a. The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

b. **Transmittal Letter or Prefatory Material.** (1) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(2) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(3) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(4) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(5) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(6) Identification of the NRA, by number and title, to which the proposal is responding;

(7) Dollar amount requested, desired starting date, and duration of project;

(8) Date of submission; and

(9) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

c. **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting appropriate identification, such as page numbers, in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice

Restriction on Use and Disclosure of Proposal Information. The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

d. **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

e. **Project Description.** (1) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(2) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

f. **Management Approach.** For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described. Intensive working relations with NASA field centers that are not logical inclusions elsewhere in the proposal should be described.

g. **Personnel.** The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the

project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

h. **Facilities and Equipment.** (1) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use.

(2) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

i. **Proposed Costs.** (1) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all manpower data in terms of man-months or fractions of full-time.

(2) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases. (Standard Form 1411 may be used).

(3) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

j. **Security.** Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

k. **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

l. **Special Matters.** (1) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(2) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

8. Renewal Proposals

a. Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

b. NASA may renew an effort either through amendment of an existing contract or by a new award.

9. Length

Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments: their availability may be mentioned in the proposal.

10. Joint Proposals

a. Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements

contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

b. Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

11. Late Proposals

A proposal or modification received after the date or dates specified in an NRA may be considered if the selecting official deems it to offer NASA a significant technical advantage or cost reduction.

12. Withdrawal

Proposals may be withdrawn by the proposer at any time. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

13. Evaluation Factors

a. Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

b. Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

c. Evaluation of its intrinsic merit includes the consideration of the following factors, none of which is more important than any other:

(1) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(2) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(3) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(4) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

d. Evaluation of the cost of a proposed effort includes the realism and reasonableness of the proposed cost and available funds.

14. Evaluation Techniques

Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

15. Selection for Award

a. When a proposal is not selected for award, and the proposer has indicated that the proposal is not to be held for subsequent reviews, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

b. When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model contract and other information which will be of use during the contract negotiation.

16. Cancellation of NRA

NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation. Cancellation may be followed by issuance and synopsis of a revised NRA, since amendment of an NRA is normally not permitted.

Standard Forms

- Program Specific Cover Pages
  - Cover Page for Planetary Astronomy and Planetary Atmospheres
  - Cover Page for Cosmochemistry
  - Cover Page for Planetary Geology and Geophysics
- Other Personnel
- Proposal Abstract
- Total Budget Summary
- Yearly Budget Summary
- Current and Pending Support
- Certification Regarding Debarment, Suspension, and Other Responsibility Matters
  - A signature is required for all proposals, including renewals.
- Certification Regarding Drug-Free Workplace Requirements
  - A signature is required for all proposals, including renewals.
- Certification Regarding Lobbying (if total multi-year funding > $100,000)
  - A signature is required for all proposals, including renewals.

REQUIRED CONTENTS OF STANDARD PROPOSAL

COVER SHEETS

- COVER PAGE
- OTHER PERSONNEL
- PROPOSAL ABSTRACT
- BUDGET SUMMARY FOR TOTAL
- BUDGET SUMMARY FOR EACH YEAR
- CURRENT AND PENDING SUPPORT
- TABLE OF CONTENTS

MAIN BODY OF PROPOSAL

- RESEARCH OBJECTIVES
- DETAILED WORK PLAN
- EXPECTED RESULTS
- RELEVANCE OF PROPOSED WORK
- ROLE OF PI, CO-I, AND OTHER PERSONNEL
- DATA REQUIREMENTS
- SUPPORTING FACILITIES
- REFERENCES

RESUMES OF PRINCIPAL INVESTIGATOR AND CO-INVESTIGATORS

DETAILED BUDGETARY AND ADMINISTRATIVE INFORMATION

CERTIFICATIONS

- CERTIFICATION REGARDING DRUG FREE WORKPLACE
- CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS
- CERTIFICATION REGARDING LOBBYING (IF REQUIRED)

APPENDICES

PLANETARY ASTRONOMY AND ATMOSPHERES PROGRAMS

Log No.
Date Received: _____

Do not write in the shaded area.

NRA #: 97-OSS-04 **Grant/Contract/RTOP #:** _____
Date Submitted: _____
Please check all boxes appropriate to this NRA:

☐ **Planetary Astronomy** ☐ **Planetary Atmospheres** ☐ **Major Equipment**

☐ **Full Proposal: New Research** ☐ **Full Proposal: Renew Ongoing Research**

For Planetary Astronomy Research Areas (please check only the one box that indicates the primary intent of the proposal)

☐ Inner Planets & their satellites ☐ Outer Planets & their satellites ☐ Small Bodies (Asteroids, Comets, etc.) ☐ Facility Support/ Instrumentation

For Planetary Atmospheres Research Areas (please check only the one box that indicates the primary intent of the proposal)

☐ Structure/ Composition ☐ Dynamics ☐ Particles/ Aerosols ☐ Radiative Transfer ☐ Molecular Properties/Spectra

☐ Aeronomy/ Theory ☐ Aeronomy /Energy Deposition ☐ Aeronomy/ Chemistry ☐ Solar Wind Interaction

Type of Organization: _____
(Profit, non-profit, university, etc.)

Proposal Title: _____

Principal Investigator (Name): _____

Institution: _____

Address: _____

City/State/Zip Code: _____
Telephone: _____ **Fax:** _____
E-Mail Address: _____

_____ _____
Signature Date

Institutional Authorization Official: _____

_____ _____
Signature Date

Address: _____
City/State/Zip Code: _____
Telephone: _____**Fax**:_____

COSMOCHEMISTRY PROGRAM

Log No.
Date Received:

Do not write in the above area.

NRA #: 97-OSS-04 **Grant/Contract/RTOP #:** _____
Date Submitted: _____

Please check all that apply to this NRA:

☐ **Mineralogy/ Petrology** ☐ **Analytic and Experimental Geochemistry** ☐ **Isotope Geochemistry** ☐ **Major Equipment**

☐ **Full Proposal New Research** ☐ **Supplement (Progress) Proposal** ☐ **Full Proposal Renew Ongoing Research**

Research Area: _____
(Indicate main research area; i.e., inner planets, outer planets, comets, solar nebula, etc.)
Type of Organization: _____
(Profit, non-profit, university, etc.)

Proposal Title: _____

Principal Investigator (Name): _____

Institution: _____

Address: _____

City/State/Zip Code: _____

Telephone: (____)_____ **Fax**: (___) _____
Internet Address: _____

_____ _____
Signature Date
Institutional Authorization Official:

_____ _____
Signature Date

Address: _____
City/State/Zip Code: _____
Telephone: (____)_____ **Fax**: (___) _____

PLANETARY GEOLOGY AND GEOPHYSICS

Log No.

Date Received:

Do not write in the above area.

NRA #: 97-OSS-04 **Grant/Contract/RTOP #:** _____

Date Submitted: _____

Please check all that apply to this NRA:

☐ **Geology** ☐ **Geophysics** ☐ **Solar System Dynamics**

☐ **Remote Sensing** ☐ **Geologic Mapping** ☐ **Cartography**

☐ **Major Equipment**

☐ **Full Proposal: New Research** ☐ **Full Proposal: Renew Ongoing Research** ☐ **Supplement (Progress) Proposal**

Proposal Title: _____

Principal Investigator (Name): _____

Institution: _____

Type of Organization:_____
(Profit, non-profit, university, etc.)

Address: _____

City/State/Zip Code: _____

Telephone: (____)_____ **Fax**: (_____) _____
Internet Address: _____

_____ _____
Signature Date

Institutional Authorization Official:

_____ _____
Signature Date

Address: _____
City/State/Zip Code: _____
Telephone: (____)_____ **Fax**: (_____) _____
Internet Address: _____

Institution Contact or Business Representative:

Telephone: (____)_____ **Fax**: (____)_____

Please list all names and institutions below (use separate sheet if necessary)

Co-Investigators: **Institutions**:

Collaborators: **Institutions**:

Proposed Duration of Project: _____ months

Desired Start Date: _____ **End Date**: _____

Budget Request:

Year 1	Year 2	Year 3
$_____	$_____	$_____

Total Funding Requested: $_____

RTOP#_____
GRANT/CONTRACT NO._____

PROPOSAL SUMMARY

TITLE:_____

PRINCIPAL INVESTIGATOR:_____

INSTITUTION:_____

FIRST YEAR REQUESTED FUNDS:_____

FIRST YEAR REQUESTED START DATE:_____

FIRST YEAR REQUESTED END DATE:_____

ABSTRACT

Type single-spaced within the space provided below. List:

1) Goals, overall objectives and justification of the work;
2) Progress and accomplishments of the prior year, or "new proposal";
3) Anticipated accomplishments listing what will be done this year, as well as how and why
4) PI's relevant publications on separate page (list in this way: Smith, A. B.: Spectroscopy of Comet Halley. AP. J. 123, 25-37, 1987).

DO NOT USE ADDITIONAL SHEETS.

RTOP#_____
GRANT/CONTRACT NO._____

FULL BUDGET SUMMARY

TITLE:_____

PRINCIPAL INVESTIGATOR:_____

FULL DURATION REQUESTED: _____YRS START DATE: _____ END DATE:_____

1. SALARIES AND WAGES.....$_____
2. SUPPLIES AND MATERIALS.....$_____
3. EQUIPMENT PURCHASES.....$_____
4. COMPUTER TIME (paid with PI funds).....$_____
5. SERVICES.....$_____
6. PUBLICATIONS AND COMMUNICATIONS.....$_____
7. TRAVEL*.....$_____
8. OTHER (INCLUDING BENEFITS AND OVERHEAD).....$_____
9. SUBTOTAL FULL DURATION BUDGET.....$_____
10. INSTITUTIONAL CONTRIBUTIONS.....$_____
11. CARRYOVER FROM PREVIOUS AWARD.....$_____
12. TOTAL BUDGET REQUESTED FOR ALL YEARS
NEW FUNDS REQUESTED FROM NASA (LINE 9, 10, 11) $_____

****

SUMMARY OF STAFFING REQUEST (NEAREST $K, NEAREST 0.1 WORKYEAR)

1.	SENIOR PERSONNEL (GIVE NAMES)	_____wy	$_____
2.	TECHNICAL SUPPORT (GIVE NUMBER)	_____wy	$_____
3.	OTHER	_____wy	$_____
4.	TOTALS	_____wy	$_____

* Provide names of travelers, dates, and destinations for each year of support requested.

SUMMARY OF FUNDING REQUEST (NEAREST 0.1 WORKYEAR, NEAREST $0.1K)

SENIOR PERSONNEL	_____wy	$_____
TECHNICAL SUPPORT	_____wy	$_____
OTHER	_____wy	$_____
TOTALS	_____wy	$_____

RTOP#_____
GRANT/CONTRACT NO._____

YEARLY BUDGET SUMMARY

FIRST YEAR BUDGET AND PERSONNEL SUMMARY BREAKDOWN

TITLE:_____

PRINCIPAL INVESTIGATOR & INSTITUTION:_____

SUMMARY OF FIRST YEAR PROPOSED COSTS: (nearest $K)

1. SALARIES AND WAGES.....$_____
2. SUPPLIES AND MATERIALS.....$_____
3. EQUIPMENT PURCHASES.....$_____
4. COMPUTER TIME (paid with PI funds).....$_____
5. SERVICES.....$_____
6. PUBLICATIONS AND COMMUNICATIONS.....$_____
7. TRAVEL*.....$_____
8. OTHER (INCLUDING BENEFITS AND OVERHEAD).. $_____
9. SUBTOTAL FIRST YEAR BUDGET.....$_____
10. INSTITUTIONAL CONTRIBUTIONS.....$_____
11. CARRYOVER FROM PREVIOUS AWARD.....$_____
12. TOTAL BUDGET REQUESTED FOR ALL YEARS
NEW FUNDS REQUESTED FROM NASA (LINES 9, 10, 11) $_____

****

SUMMARY OF STAFFING REQUEST (NEAREST $K, NEAREST 0.1 WORKYEAR)

1.	SENIOR PERSONNEL (GIVE NAMES)	_____wy	$_____
2.	TECHNICAL SUPPORT (GIVE NUMBER)	_____wy	$_____
3.	OTHER	_____wy	$_____
4.	TOTALS	_____wy	$_____

* Provide names of travelers, dates, and destinations for each year of support requested.

SUMMARY OF FUNDING REQUEST (NEAREST 0.1 WORKYEAR, NEAREST $0.1K)

TASK SHORT TITLE	SENIOR PERSONNEL	TECHNICAL SUPPORT	OTHER COSTS
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____

CURRENT AND PENDING RESEARCH SUPPORT

Include all current research support for all other sources. Also include the proposed project and all other research requiring a part of the PI's time. State the number of person months regardless of the source of the support.

Name of Principal Investigator _____

A. Current Support

1. Source of Support _____
2. Project Title _____
3. Award Amount _____
4. Period of Award _____
5. Person-Months _____

B. Pending Proposals (including supplement applications)

1. Source of Support _____
2. Project Title _____
3. Award Amount _____
4. Period of Award _____
5. Person-Months _____

Other Agencies to which this proposal, or parts thereof, has been submitted:

_____

_____

Duplicate this page as many times as needed to provide a complete list.

Certification Regarding Drug-Free Workplace Requirements
Grantees Other Than Individuals

This certification is required by the regulations implementing the Drug-Free Workplace Act of 1988, 34 CFR Part 85, Subpart F. The regulations, published in the January 31, 1989 Federal Register, require certification by grantees, prior to award, that they will maintain a drug-free workplace. The certification set out below is a material representation of fact upon which reliance will be placed when the agency determines to award the grant. False certification or violation of the certification shall be grounds for suspension of payments, suspension or termination of grants, or government wide suspension or debarment (see 34 CFR Part 85, Sections 85.615 and 85.620).

This grantee certifies that it will provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing a drug-free awareness program to inform employees about -
- The dangers of drug abuse in the workplace;
- The grantee's policy of maintaining a drug-free workplace;
- Any available drug counseling, rehabilitation, and employee assistance programs, and
- The penalties that may be imposed upon employees for drug abuse violations in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will -
- Abide by the terms of the statement; and
- Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction;

(e) Notifying the agency within ten days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction;

(f) Taking one of the following actions, within 30 days of receiving notice under subparagraph (d)(2) , with respect to any employee who is so convicted -
- Taking appropriate personnel action against such an employee, up to and including termination; or
- Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraph (a), (b), (c), (e), and (f).

Organization Name | PR/Award Number or Proposal Name

Name and Title of Authorized Representative

Signature | Date

Certification Regarding
Debarment, Suspension, and Other Responsibility Matters
Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participant's responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211).

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
   (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
   (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statues or commission of embezzlement theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
   (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
   (d) Have not within three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name | PR/Award Number or Proposal Name

Name and Title of Authorized Representative

Signature | Date

Certification Regarding Lobbying

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000, and not more than $100,000 for each such failure.

Organization Name | PR/Award Number or Proposal Name

Name and Title of Authorized Representative

Signature | Date

MAJOR EQUIPMENT REQUEST

I. INTRODUCTION

The NASA Office of Space Science (OSS) may provide funding for the upgrading of analytical, computational, telescopic, and other instrumentation required by investigations sponsored by the programs in this NRA. New major instrumentation that is necessary for the conduct of proposed research, or that would substantially improve its quality, or would significantly benefit the broad science community, should be identified and requested in a special section of each proposal entitled Major Equipment Request.

In order to make the best possible use of the funds that may be available, proposers who request funds for equipment are encouraged to seek cost sharing where appropriate and to propose collective use where that is reasonable, i.e., instruments that could be made available for use by other qualified members of the planetary science community. Cost-shared proposals would be especially attractive for very high cost instruments, provided the partners provide a written statement regarding long term funding and institutional commitment.

However, proposers need to recognize that NASA interprets cost-sharing arrangements as joint ownership, and that NASA has the option to retain title to instruments acquired under such arrangements. Issues of ownership and title may be especially complicated under arrangements that involve other Federal agencies (e.g., the National Science Foundation). When joint ownership cannot be avoided, and the requested NASA contribution will exceed $1000, agreement regarding NASA retention of its option to take title, and the conditions under which the option (if retained) will be exercised, shall be reached and documented prior to purchase.

II. EXCLUSIONS AND RESTRICTIONS

Instrumentation or support equipment costing less than approximately $20,000 is not considered major. Requests for such items should be included in the body of the research proposal to the discipline program. Instrumentation or equipment considered inappropriate includes personal computers or computer peripherals (unless these are integral parts of the instrumentation requested), miscellaneous support equipment, support contracts, and equipment repair where the repair does not involve significant enhancement of the instrument's basic capabilities. Nor should funds be sought to support maintenance and continued operations of any instrument requested. These funds must be requested in the main body of the proposal, not in the Major Equipment Request.

In no event will proposals be considered that seek to design, develop, test, or evaluate new instruments that are to be considered for sale.

III. MAJOR EQUIPMENT REQUEST REQUIREMENTS

A request for major equipment should be written so that it can be reviewed as a stand-alone proposal, although it will be reviewed in connection with the science proposal. This is especially important for proposers who are operating under multiyear approvals and who normally would submit only a progress report proposal. This is also important because equipment requests may also be reviewed by a multidisciplinary group external to the normal review process. All requests should contain a short abstract and sections on project description, management, and costs.

Kinds or classes of instruments that are considered appropriate are listed below. Please note that this list is not intended to be inclusive, but rather illustrative of the range of instrument types (and hence costs) that are appropriate. Requests for instruments not specifically identified in the list will receive equal consideration.

Types and Classes of Instruments that Might be Requested

Solid source, light element, and noble gas mass spectrometers; Electron microprobe; Scanning electron microscope; Transmission electron microscope; Cameca-class ion microprobe; Activation analysis equipment; X-ray fluorescence analyzer; Organic analysis instrumentation; Static high pressure instrumentation; Portable high-speed charge-coupled device for occultation measurements; Telescopic instrumentation; High resolution infrared spectrometer; Large format optical charge-coupled device (2000 x 2000 pixels) with coronograph; Faint object infrared spectrometer; Near

infrared array camera with coronograph; Instrumentation for planetary atmospheres laboratory studies; Coolable white cells; Tunable dye-laser high resolution spectrometer; Instrumentation for measurement of gas phase reaction rates, photochemical reaction rates and branching rates, and collisional disassociation/ionization/recombination cross-sections.

Project Description

The main body of the request should first identify the instrument to be acquired or developed and the type of use proposed. It should contain a strong justification, including a description of why the instrument is necessary for the investigator's research or how it would enhance that research, citing specific examples wherever possible. It should also demonstrate why the enhanced capability is important to planetary science in general. If an instrument is proposed for the benefit of the science community, the justification should emphasize, as well, how the enhanced capability would benefit the larger planetary science community. All justifications should address how the requested instrument relates to existing capabilities, both in the investigator's own laboratory and to others in the community.

Any substantial collaboration with individuals not referred to in the budget, or use of consultants, should be described. If cost-sharing or substantial institutional contributions are anticipated, this should be described. It should be noted that cost sharing (between NASA and other agencies such as the Department of Energy or the National Science Foundation) is encouraged to the extent that NASA's share of the cost will ensure adequate use by NASA investigators. This aspect of any proposed cost-sharing acquisition must be discussed in the proposal. If other agencies have been approached or have made tentative commitments, the proposal should document that and provide names and telephone numbers of appropriate officers in those agencies who can discuss their agencies' interest.

When it is expected that the acquisition or development of an instrument or facility will require more than one year, the proposal should cover the complete project but with a clear distinction between the efforts involved in each requested year.

Management

If the instrumentation is intended to be used by the scientific community, in addition to the Principal Investigator, a management section is required. This section should include a description of how the requested instrument would be managed. This description should include a statement of the percentage of the instrument's time that would be available to other users and a general statement regarding aspects of user access, such as time of day when access would be granted, whether access would be hands on or by an operator or collaborator in the PI's group, cost of use and how costing would be handled, and how users would gain access (personal communication, proposal, etc.).

Requests for an instrument should specify how the instrument is to be used, whether by Principal Investigator (PI) and the PI research group only, or by the PI group as well as other investigators (facility instrument). These categories are defined below.

Investigator Instrument: An investigator instrument is an instrument acquired or developed by an investigator to support his or her research where he or she has full authority for its exclusive use and where there are no commitments to make the instrument available to other investigators.

Investigator Facility Instrument: An investigator facility instrument is an instrument acquired or developed by an investigator to support his or her research where an identified portion of its time is to be reserved for use by the PI but where an additional, specified portion of its time will be made available to other knowledgeable planetary program investigators and where all details or access, method of use, charging, and data rights are determined by the PI in negotiation with potential users.

Regional Facility Instrument: A regional facility instrument is an instrument of considerable cost or one which is limited to one location by virtue of its use on a specific beam source or telescope facility, but is acquired by a PI to support his or her research. A significant, specified portion of a regional facility instrument's time will be reserved for use by the PI, but a significant, specified portion of its time must be available to other planetary program investigators. Unlike an investigator facility instrument, however, all details of access, announcement of availability, assistance to be provided on its use and methods of use (whether hands on or by an operator), charges, and data rights must be documented and agreed to by NASA and the sponsoring institution before NASA support is

provided.

Costs

If the instrument in question is to be acquired from commercial sources, only those costs directly associated with the acquisition, installation, and check-out of the instrument should be requested. No costs for maintenance or operation beyond the check-out period should be included. These must be requested in research proposals submitted to the appropriate discipline programs. If the instrument is to be developed by the investigator, all costs associated with the development and final check-out should be requested. Multiyear requests would be expected in these cases. In all cases, however, provision of an adequately documented cost section will facilitate evaluation, and if selected, improve the likelihood of a timely award. It is especially important that each relevant cost category (Direct Labor, Fringe Benefits, Overhead, and Other Direct Costs such as Computer Use, Equipment, Travel, etc.) be detailed, explained, and substantiated in the proposal. For example, Direct Labor costs should include a listing of each labor type, hours to be expended, and salary rates used to calculate the yearly costs. Travel requirements should be explained in terms of the number of trips (travelers) to each destination, their duration, and all associated costs broken down by airfare, per diem, and ground transportation. Equipment costs should be itemized with references as to the source of the estimates. Finally, the basis for costs based on rates (Fringe Benefits, Overhead, etc.) should be explained. A summary would also be useful wherein costs for each major cost category is given for each year of requested support, together with a total for each year and a grand total for all years requested.

IV. EVALUATION

Evaluation factors will be those employed in evaluation of proposals received in response to an NRA, given in Appendix B, with the following additions. In considering the relevance of the request to the NASA and research in planetary sciences objectives, attention will be focused on the value that would be added by the addition of the instrument capability to ongoing and anticipated research of the proposer, in particular, and to planetary science investigations in general. In evaluating the intrinsic merit of the request, additional factors that will be considered of equal weight to each of those listed in Appendix B (Section 13c) are the scientific merit of the original proposal to which the request is tied and the value that the new or enhanced capability would add to science and/or education beyond that offered specifically to planetary science.

The process to be followed in the evaluation is to have the equipment request reviewed by each discipline peer review panel during the full proposal review and in the context of research proposed. Those requests that most clearly meet the criteria outlined in terms of scientific merit, program balance, and funding as judged by the peer panels will be referred to a special panel composed of the pertinent OSS Discipline Scientists. This panel will consider all referred requests. Recommendations made by this panel will be referred to the Director, Research Program Management Division for final selection.

V. SELECTION

Requests that are selected for support will be funded through augmentations to the grants/contracts that provide support for the investigator's basic research program. If requests involve multiple year periods of performance, for development activities, for example, annual augmentation to the basic continuing grants/contracts may be provided upon receipt, review, and selection of supplement proposals.